

Application of Sustainable Architecture at Harris Hotel Bekasi

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Abstract:- Hotels are something that is now liked and even a necessity for some people. The hotel is not just a place to stop, but also has various functions, depending on who the hotel is used for. The hotel which originally had the main function as accommodation has now expanded to a recreational function. Directly. Proportional to the increasing number of customers, the need for hotels is also increasing. In order to maintain the quality of its services while maintaining its standing place, Green Architecture is here as an answer to this problem. Green Architecture which is essentially an effort to minimize the impact of development on the environment, with all the current developments in science and materials is considered capable of being juxtaposed with the demands and even needs of the community for hotel buildings.

Keywords:- Hotel, Green Architecture.

I. INTRODUCTION

The current tourism potential is growing along with the evolution of humans and their needs. Nowadays, people are starting to know the term 'healing' which is an activity of taking a break from the hustle and bustle of the world that they live every day. People are beginning to understand that humans need to rest and take a break from monotonous activities that drain the mind.

As one of the supporting objects in the world of tourism, hotels are a must-have thing that is sought after every time you travel. Not only by tourists outside the city, but also by local tourists who want a new 'rest' atmosphere. Therefore, hotels are required to provide comfort like home for their residents.

The number of hotels is currently mushrooming with various types and facilities offered. According to the latest data on the number of accommodations, rooms, and beds available at star hotels from the Central Statistics Agency for the West Java and DKI Jakarta areas, it currently stands at 104,555, 12,460 different from the previous 10 decades.

The amount of energy used in each hotel building varies according to the hotel facilities offered and the hotel's needs to meet them. Green Architecture, in its branch of science called Sustainable Architecture or also called Sustainable Architecture is one of the efforts in the world of architects to strive for a good impact of buildings on the environment.

In this paper, the author will examine the application of Sustainable Architecture to the building of one of the hotels in the city of Bekasi which is a building attached to a mall that has applied Green Architecture in its construction.

II. FOCUS AND SCOPE

Basically, this research covers two main aspects. The first is research on buildings, including: hotel interior & exterior materials, energy used, operational systems in general.

The second is related to Sustainable Architecture and its application to the construction of Harris Hotel Bekasi, including: its effect on material durability, the availability of raw materials in the future and the impact on the psychology of building users.

III. LITERATURE REVIEW

A. Sustainable Architecture

Sustainable Architecture is a concept that pays attention to every aspect of development with a focus on environmental sustainability. This sustainable architecture is an effort to preserve natural resources for a longer period of time by considering their potential for use in a project and their impact on their availability in the future. This sustainable architecture seeks to explore the causes and effects of a project from the ecological perspective of humans, such as climate, agricultural systems, industry, forestry and of course the architecture itself.

Paola Sassi (2006) in his book *Strategies for Sustainable Architecture* explained that there are components that must be considered in order to be able to be built into a good sustainable design, namely Site & Land Use, Community, Health and Well-being, Material, Energy, Water.

B. Hotel Building

A hotel is a building, company or business that provides accommodation services and also provides food and beverages for guests who come and has other service facilities. All of the facilities are also intended for the general public.

The hotel also provides a room to be used as seminars, several events and also facilitates it.

In Roman times there were inns called "mansiones" along the main streets of the city that were rented out to travelers. Mansiones itself means flat. Between one mansion and another, it is usually up to tens of kilometers. In the later periods, when traveling far away, more and more people were doing it, especially for trade activities, pilgrimages, and military activities, more and more inns were established.

The hospitality industry flourished in the 19th century. Modern hotels began to be established in many major cities, such as London, Paris, New York, Boston, San Francisco, and others. The managers of these hotels not only offer temporary accommodation packages, but also begin to provide meeting and conference venues along with the latest technological devices, such as telephones and televisions. In fact, at the end of the 19th century, hotels with special labels appeared, for example hotels for business travelers, for example the Ellsworth Milton Statler Hotel in New York which was founded in 1880. This hotel is also a chain hotel aka the first hotel chain in the world. Luxury hotels began to emerge, the Waldorf-Astoria Hotel (founded in 1896) in New York and The Brown Palace in Denver, Colorado. Both were among the hotels with the highest visited rates in America at the time.

In the 20th century, especially after the end of World War I, the number of hotels increased with the development of mass transportation and the development of the travel business. Many of these new hotels were established around business centers. Another thing that also affects the development of the hotel industry is the development of the tourism world which then gave birth to resort hotels that offer lodging packages as well as accommodation. During this period, since the 1920s, hospitality schools began to appear in many places. During World War 2, and in the period that followed, the hospitality business flourished. However, at that time almost no new hotels were built.

C. Energy Consumption Patterns of Hotel Buildings

The hospitality sector is included in the commercial sector, which contributes to national energy use of 3% with a growth rate of 8.6% per year. The hospitality sector itself is growing very rapidly in Indonesia, with a growth rate of 12.5% from 2007 to 2011, in response to an increase in the number of tourists between 9-13% during that period.

Efficient use of energy in hotel buildings means that energy is used to meet the needs of guests as optimally as possible, without any wasted or excessive energy. Conversely, focusing on energy savings without paying attention to guest satisfaction is not a form of energy efficiency. In practice, energy saving in hotel buildings still prioritizes the 4K principle, namely:

- Comfort
- Safety
- Beauty/aesthetics
- Staff work smoothly

The focus of energy savings can be given to equipment that uses electrical energy sources from PLN for significant results, then LPG and diesel/diesel. In addition, it can also start from the air conditioning system, as the largest energy user in hotel buildings.

The energy cost component in a hotel is usually expressed in terms of cost per room sold, or the total number of hotel rooms. Ideally, the calculation of energy costs is carried out daily and reported to management and other divisions in support of energy saving programs. In addition, periodic calculations and reporting are part of the review and evaluation process in a good energy management program, so that energy usage trends in hotels can be analyzed and known. It can also be used to help plan for a gradual reduction in energy consumption in hotel rooms, or as part of an overall environmental awareness program. In the "Hotel Energy Benchmarking and Strategic Energy Management" program, USAID-ICED also analyzes the energy cost per hotel room sold to provide an overview of the average energy cost, especially for 4- and 5-star hotels.

D. Implementation of Energy Management System (SME).

Without the implementation of SMEs, the implementation of energy saving programs can experience cycles as shown in Table A, while energy saving goals can be achieved with a more targeted system, as shown in the following Figure.

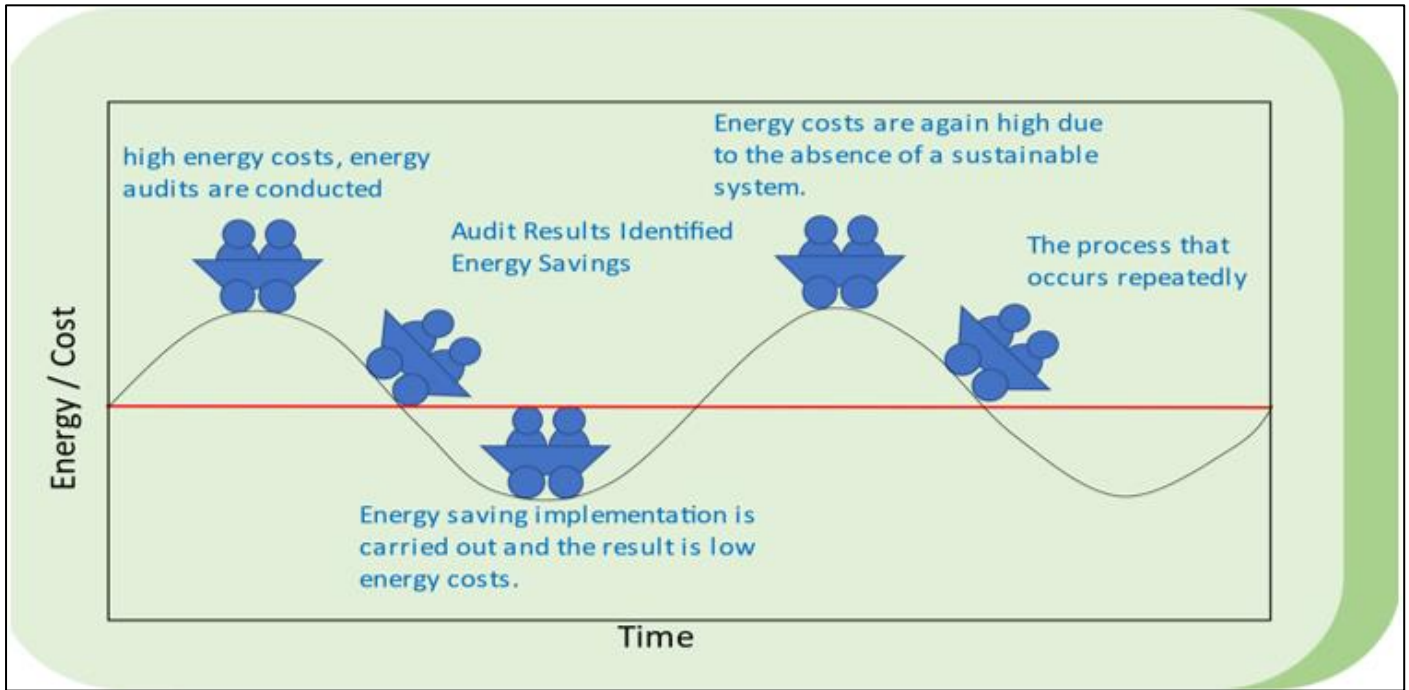


Fig 1: Implementation of Cycle A Energy Management System

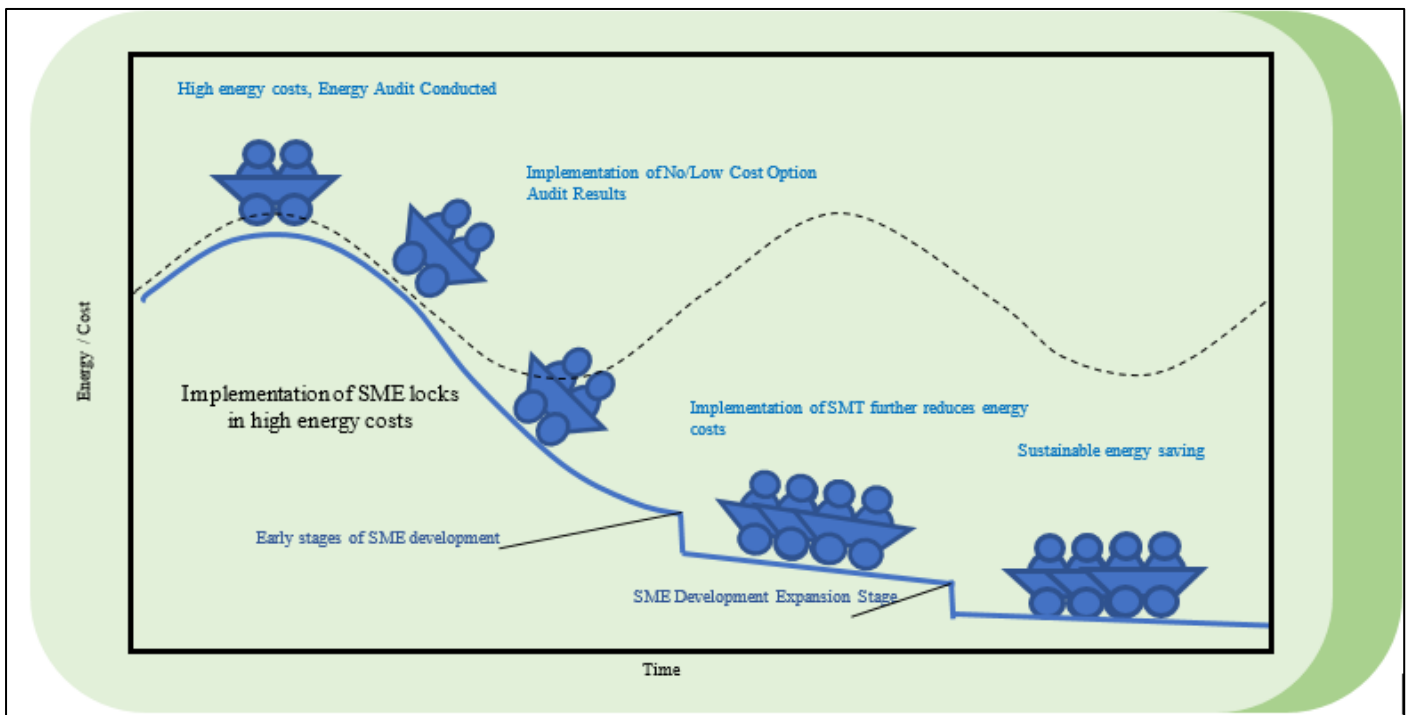


Fig 2: Implementation of Cycle B Energy Management System

IV. RESEARCH METHODS

The object of the research is Harris Hotel Bekasi. Harris Hotel Bekasi is located in the Summarecon area of Bekasi. Starting the Soft Opening on January 1, 2015 and the Grand Opening on May 21, 2015. The property is specially designed to welcome both tourists and business travelers. HARRIS Hotel & Conventions Bekasi carries a modern, young and trendy style which is reflected in the design of hotel rooms that follow current trends and are equipped with international standard facilities.

HARRIS Hotel & Conventions Bekasi has a height of 17 floors and one basement floor consisting of 332 rooms and suites designed to provide a satisfying stay and professional environment for business travelers. For corporate events and private events, such as product launches, fashion shows, or birthday events, the HARRIS Convention Center, which consists of a combined 15 comfortable meeting rooms, can accommodate up to 2,500 people, and is equipped with modern facilities.

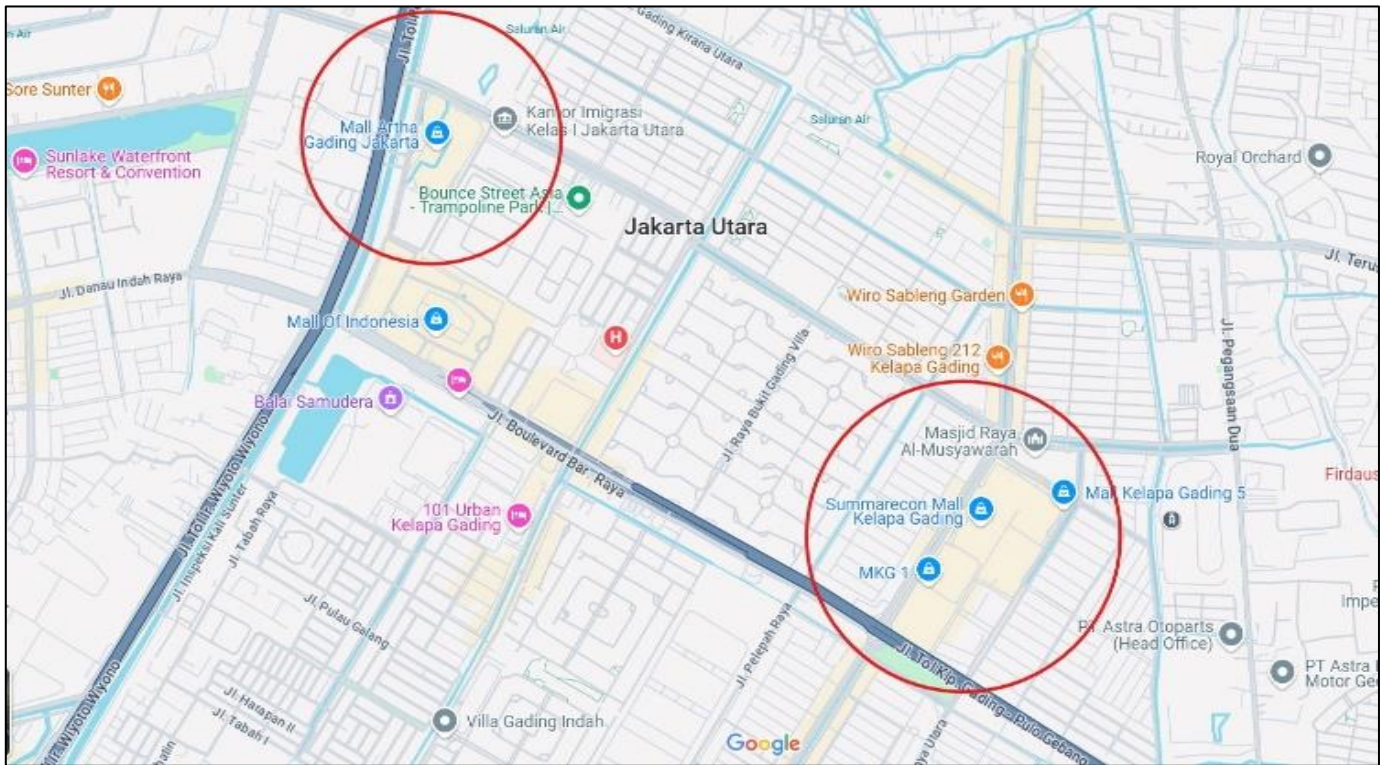


Fig 3: Location Map of HARRIS Hotel & Conventions Bekasi



Fig 4: HARRIS Hotel & Convention Building.

The research on the application of Sustainable Architecture in the Harris Hotel Bekasi building includes complaints, views, energy consumption, green space, and

materials used which are then compared to energy saving standards in the hotel building.

V. RESULTS AND DISCUSSION

A. Data Collection

➤ Complain Customer

Reporting from Trip Advisor, Online Travel, and direct complaints from visitors to the management of Harris Hotel Bekasi, the most customer complaints are about parking and pools that are too small. The number of rooms at Harris Hotel Bekasi is 322 rooms.

➤ View.

The layout of the room placement is made linear with the northwest side facing the Springlake apartment & La Spezia area, and the southeast side facing the settlement and the Emerald area.

Harris Hotel Bekasi Parking for Cars & Motors is combined with Mall parking where almost all doors are only open during Mall operations, while Hotel operating hours are 24 hours.



Fig 5: View Hotel from Top

For a view from the end-to-end corridor overlooking Downtown Walk Summarecon Mall Bekasi & Summarecon Culinary Area Bekasi.



Fig 6: View from the Corridor

In the image View Energy Usage & Utility System:

➤ *Water.*

The water system in the Harris Hotel Bekasi building with the most energy use is the cooling tower. The water supply for this building comes from the manager of the Summarecon Bekasi area, is forwarded to the Ground Water Tank, then to the Roof Tank, from the Roof Tank the water will be supplied to each consumption.

For its own savings efforts, the manager of Harris Hotel has launched recycling water treatment, where the use of used water is processed so that it can be reused for special needs such as flushing toilets, watering plants and cooling the tower itself.

➤ *Ventilation.*

The air conditioning system in the Harris Hotel Bekasi building in general uses a central air conditioner which is then supplied to each room unit.

For its own savings efforts, the building seeks to monitor the supply to adjust to the outside climate with the control of the chiller.

➤ *Electricity.*

The electrical system used in the Harris Hotel Bekasi building is a commonly used electrical installation. For its own source, this building has the same 'heart' as Summarecon Mall Bekasi, a building that stands as a unit with a mutually supportive function with Harris Hotel Bekasi. The power source building for these two buildings is called the Power House. For its own savings efforts, the building applies motion sensors to staircase and all lights already use LEDs.

➤ *Disposal.*

The disposal system used is using a special STP for hotels, separate from Summarecon Mall Bekasi. As an effort to save money, the disposal system treats used water for cooling tower needs and others as explained above.

➤ *Green Space.*

The green space at Harris Hotel Bekasi is very minimal, there are only 2 areas where the green space can be seen, namely in the lobby area, entrance and a few potted plants in the swimming pool on the 6th floor. Government regulations stipulate that 40% of green space must be fulfilled in one development area.

➤ *Material Interior & Eksterior.*

The interior material that is a problem in this building is the finishing for the function hall whose soundproof application is not optimal. The function hall is given carpet finishes for the floor and foam for the walls, but the noise from the mall can still reach the inner area.



Fig 7: Exterior of HARRIS Hotel & Convention

The exterior material itself only uses paint finishing concrete with a little ACP on the signage. For the exterior problem, there is in the arrangement of the façade of the

building which does not have a barrier for light from the northwest and southeast.



Fig 8: Sunlight from Outside the Building

It can be seen from the image above that the hot sun directly affects the heat of the glass until it enters the hotel room room. This affects the performance of the air conditioner which must work more optimally to achieve the customer's comfort temperature standard.

B. Data Analysis

Based on the above data, Harris Hotel Bekasi's energy savings are as follows:

Table 1: Energy Saving Aspects Through the Envelope of the Harris Hotel Bekasi & Convention Building

Aspects of Energy Saving Through Building Envelopes	Immersion at Harris Hotel Bekasi		Information
	Yes	Not	
Installing shading devices on exterior windows to Minimizing solar radiation		√	No overtake or Shade on buildings
The use of double glazed glass glass for window glass, or coated with window film		√	No double glass
Replacing Glass Material to lower OTTV value (Overall Thermal Transfer Value)		√	Material kaca Clear Glass
The use of building exterior wall materials that have better heat retention or thermal insulation properties		√	Concrete walls are only finished with ACP paint in some part.
The use of plants on the roof wall so that the ability to The thermal insulation of the roof wall becomes better		√	Minimal plant use
Reduces air/light infiltration by improving insulation walls, windows and doors	√		The meeting of each glass to the Neat disealent wall
Changing the color of the exterior wall paint from dark to a lighter color, for example by changing the color of the exterior wall paint from dark gray to white	√		Harris Hotel tends to use bright and <i>eye-catching</i> colors on The façade
Reducing the ratio of the area of the outside window to the area of the outside wall (modification of the Window Wall Ratio)	√		Ratio adjusted to space limits. Predominantly concrete walls.
Combining the Effects of WWR and SHGC (Solar Heat Gain Coefficient)		√	Concrete walls are only finished with ACP paint in some part.

Table 2. Aspects of Energy Saving Through the Air Conditioning System of HARRIS Hotel & Conventions Bekasi

Aspects of Energy Saving Through Air Conditioning Systems	Immersion at Harris Hotel Bekasi		Information
	Yes	Not	
Optimizing heat transfer processes	√		
Repairing and maintaining heat transfer surfaces on evaporators and condensers	√		
Application of Multi-Staging System		√	
Adjusting the Cooling Capacity of the Air System with Building Cooling Load	√		
Capacity Control on chiller compressors	√		
Implementation of multi-level refrigeration as needed	√		
Use of chilled water storage tank	√		
More efficient use of chillers with the latest technology	√		

Table 3: Energy Saving Aspects Through the Lighting System of HARRIS Hotel & Conventions Bekasi

Aspects of Energy Saving Through Lighting Systems	Immersion at Harris Hotel Bekasi		Information
	Yes	Not	
Lamp Usage Savings Promotion (e.g.: switch off policy)	√		
Lighting System Maintenance	√		
Installation of Energy-Saving Lights	√		
Substitution of Conventional (Magnetic) Reciprocal with Reciprocal Elektronik		√	
Installation of lighting sensors	√		On emergency stairs and special access only
Control of lamp usage using key-tags (in combination with the air conditioning system)	√		

Table 4: Aspects of Energy Saving Through the Hot Water System of HARRIS Hotel & Conventions Bekasi

Aspects of Energy Saving Through Hot Water Systems	Immersion at Harris Hotel Bekasi		Information
	Yes	Not	
Perform annual periodic maintenance	√		
Using automatic control equipment to operate the boiler so that the heater can be controlled Well	√		
Inspection of the control system during the treatment process	√		
Ensuring the materials used for the heating pipe, channels, and the cover has been well insulated	√		
Use insulated expansion tanks and exchangers Hot	√		
Prevent the formation of scale accumulation in the heating tube that blocks the flow and movement of air by treating Feed Water Treatment System	√		
Perform a steam distribution system inspection	√		
Clean upstream strainers and steam traps regularly to prevent particle accumulation	√		
Prevent excess air for combustion by adjusting fans, dampers, seals and increasing oversight of over-draft flames	√		
Lower the air temperature in the boiler according to the level of need to reduce short-cycle heat loss, kenvective, and radiant	√		
Consider replacing an aging boiler Above 25 years old		√	The age of the building has not yet Reach 25 years
Cleaning the fire side of the heat exchanger, the water side of the scale water from heat exchangers, burners	√		
For atmospheric pressurized boilers, check and adjust gas pressure in the pipe	√		
On forced draft boilers that exceed load capacity, check and adjust air and gas flow level	√		
To reduce the use of Steam/Hot Water in laundry, and kitchen, can be done with an automatic system	√		
Use of new technologies to supply hot water		√	

Table 5: Aspects of Energy Saving Through Electrical & Building Transportation System HARRIS Hotel & Conventions Bekasi Building

Aspects of Energy Saving Through Electrical Systems & Building Transportation	Immersion at Harris Hotel Bekasi		Information
	Yes	Not	
Efficiency in travo and electric motors	√		
Efficiency in electrical wiring systems	√		Cable size adjusFigure with the power used
Efficiency in electrical equipment	√		
Efficiency in the transportation system		√	Elevators operate 24 hours a day

Table 6: Aspects of Energy Saving Through the Application of the BAS/BEMS HARRIS Hotel & Conventions Bekasi System

Energy Saving Aspects Through BAS/BEMS System Application	Immersion at Harris Hotel Bekasi		Information
	Yes	Not	
Make sure that the parameters/indicators indicated on the monitoring system show the correct number (enter resourceful)	√		The BAS system has been fulfilled by Harris Hotel Bekasi
If any of your BAS/BEMS system equipment/components are damaged, immediately ask the supplier for replacement	√		
Ensure that the supplier provides training to the engineering team responsible for monitoring and control using the BAS/BEMS system already exists	√		
Double-check that the installed system can Used for control system or just monitoring system	√		

REFERENCES

[1]. Building Physics Book 1 – Nur Laela Latifah, ST. MT.
 [2]. ASHRAE STANDARD 55-2004
 [3]. Monica E. Kuhn dan Brad Bass “Benefits, Barriers and Opportunities for Green Roof and Vertical Garden Technology
 [4]. SNI 03-6572-2001
 [5]. http://digilib.mercubuana.ac.id/manager/t!@file_artike1_abstrak/Isi_Artikel_1_31690327502.pdf
 [6]. <https://www.summareconbekasi.com/project/detail/the-springlake-apartment>
 [7]. <https://id.weatherspark.com/>
 [8]. Muhammad Syafiq, Vertical Park Design in Urban Dense Corridors with a Sustainable Urban Landscape Approach, 2017
 [9]. <https://www.djkn.kemenkeu.go.id/artikel/baca/12773/Memahami-Metode- Penelitian-Kualitatif.html>